

# 38 Microbes, Plants, and You



**S**chleiden, Schwann, and Siebold observed cells in plants, animals, and microbes. Since then, scientists have observed cells in every living organism. What do these cells look like?

## CHALLENGE

What structures do different cells have in common? What structures are found only in some cells?

## MATERIALS



*For each group of four students*

- 1 prepared slide of *Amoeba*
- 1 piece of onion
- 1 bottle of Lugol's solution with dropper
- 1 cup of water
- 1 dropper
- 1 pair of forceps (optional)



*For each pair of students*

- 2 microscope slides
- 2 coverslips
- 1 sterile swab
- 1 microscope
- 1 paper towel



*For each student*

- 1 Student Sheet 38.1, "Cell Drawings"

## PROCEDURE

*Within each group of four students, have one pair complete Parts One, Two, and Three in order. Have the other pair first complete Parts Two and Three, and then Part One.*

### Part One: Onion Cells

1. Use forceps or your fingernail to peel off a piece of the very thin inner layer of the onion.
2. Place 1–2 drops of water on a clean slide, then place your piece of onion in the drop of water.
3. Carefully place a coverslip over the cells. Begin by holding the coverslip at an angle over the water droplet, and then gradually lower the coverslip.



4. Be sure that your microscope is set on the lowest power (the shortest objective) before placing your slide onto the microscope stage. Center the slide so that the specimen is directly over the light opening and adjust the microscope settings as necessary.

**Hint:** To check that you are focused on the material that is on the slide, move the slide slightly while you look through the eyepiece—the material that you are focused on should move at the same time as you move the slide.

5. Observe the material on the slide.

**Hint:** If material on the slide is too bright to see, reduce the amount of light on the slide: do this by slightly closing the diaphragm under the stage. Move the slide so one or several of these cells are near the center of your field of view.

6. Without moving the slide (which can be secured with stage clips), switch to medium power (usually 10x). Adjust the microscope settings as necessary. Slowly focus up and down with the fine focus knob.
7. Without moving the slide, switch to high power (usually 40x ). *Be careful not to smash the objective against the slide!* Adjust the microscope settings as necessary. Slowly focus up and down with the fine focus knob. You will see several layers of onion cells.

**Hint:** If material on the slide is too dark to see, increase the amount of light on the slide: do this by slightly opening the diaphragm under the stage.

8. Review “Microscope Drawing Made Easy” on page C-28 in Activity 36, “Looking for Signs of Micro-Life.” Select one cell to draw at high magnification. Use Student Sheet 38.1, “Cell Drawings,” for your drawings. Record the level of magnification next to your drawing.
9. Return to low power and remove the slide from the microscope. Add one drop of Lugol’s solution onto the slide at the edge of the coverslip. Place a small piece of paper towel on the opposite side of the coverslip (see Figure 1); this will draw the stain under the coverslip.
10. Observe the cells again at low, medium, and high power and add any new details to your drawing. Record whether you can find the edge of the cell. Record your observations of the inside of the cell.



Figure 1: Staining the Slide

11. When you finish your observations, rinse the slide and coverslip and pat them dry with a paper towel.

## Part Two: Cheek Cells



### SAFETY

When you prepare your slide of cheek cells, each swab should be used by only one student. After spreading your cheek cells onto the slide, immediately discard your swab in the trash. Do not use it again. If you need to make another slide, use another swab.

12. Place 3 drops of water on a microscope slide.
13. Decide which person in your team of two students will volunteer to donate some cells from the inside of his or her cheek.
14. The volunteer should *gently* rub along the inside of his or her own cheek with a sterile swab. Turn the swab as you rub, making sure that each side of the swab is rubbed against the inside of your cheek. A very gentle scraping is sufficient—be sure not to cut or scratch your mouth!
15. Transfer the cheek scrapings onto the microscope slide by stirring the side of the swab in the water.
16. *Help prevent microbes from spreading!* Discard your swab in the trash as soon as you are done.
17. Carefully touch one edge of the coverslip to the water at an angle. Slowly allow the coverslip to drop into place.
18. Use Steps 4–8 as a guide to viewing and drawing your cheek cells.



19. Return to low power and remove the slide from the microscope. Add one drop of Lugol's solution onto the slide at the edge of the coverslip. Place a small piece of paper towel on the opposite side of the coverslip (see Figure 1 on the previous page); this will draw the stain under the coverslip.
20. Observe the cells again at low, medium, and high power and add any new details to your drawing. Record whether you can find the edge of the cell. Record your observations of the inside of the cell.
21. Remove the slide and follow your teacher's directions about where to put the slide for disinfecting.

### Part Three: Microbe Cells

22. You and your partner should receive a microscope slide of *Amoeba*.
23. Use Steps 4–8 as a guide to viewing and drawing one *Amoeba* cell.
24. When you have completed all parts of the activity, turn off the microscope light and set the microscope back to low power.

## ANALYSIS

1. Compare the three kinds of cells you have just observed.
  - a. What structures do they have in common? Explain.
  - b. How are the cells different? Explain.
2. Did you find evidence in this activity that the human body is made up of cells? Explain.
3. You stained the cheek and onion cells. How did the cells look before and after staining? Explain the purpose of the stain.
4. Do you think there are any small structures (organelles) inside your cheek cell other than the nucleus? What evidence do you have to support your answer?